

Warm Up #11-5

The initial population of rabbits on a farm was 50 rabbits. The population increased by 7% each week.

1. How many rabbits were there after 30 weeks?
2. How long would it take for the population to reach 500 rabbits?

Staple up!

Week 11 Classwork

Warm Up

Blue WS (Tangents & Normals)

5D.1 p.136, # 1-3, 5, 6, 8, 9

\* Yesterday's classwork carries over to next week.

HW Questions: Mock IB test - Paper 1

You have checked your answers and  
looked at the hints for # 2, 5, & 8.

Are there any other questions you  
need help with? They will post tonight.

#14c , #13a , 12b

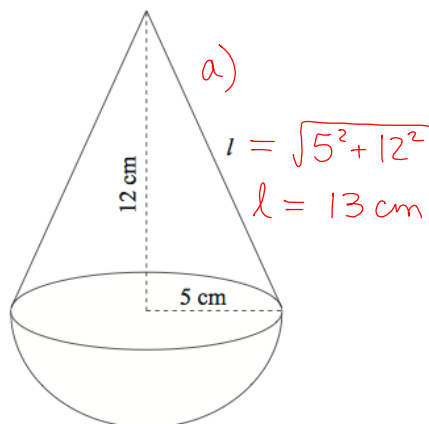
Computer Time!

# HW: IB Exam Practice (from 2014 Mock Paper 2)

Last Quiz: Tuesday, Nov. 21  
Sequences and Series

12. A child's toy consists of a hemisphere with a right circular cone on top. The height of the cone is 12 cm and the radius of its base is 5 cm. The toy is painted red.

- (a) Calculate the length,  $l$ , of the slant height of the cone.  
(b) Calculate the area that is painted red.



b) Use your formula sheet:

$$\frac{1}{2}(\text{area of sphere}) + (\text{surface area of cone})$$

$$= \frac{1}{2}(4\pi 5^2) + \pi(5)(13)$$

$$= 50\pi + 65\pi$$

$$\approx 361 \text{ cm}^2$$

13. A liquid is heated so that after 20 seconds of heating its temperature,  $T$ , is  $25^\circ\text{C}$  and after 50 seconds of heating its temperature is  $37^\circ\text{C}$ . Given points  $(t, T)$   $(20, 25)$  &  $(50, 37)$
- The temperature of the liquid at time  $t$  can be modelled by  $T = at + b$ , where  $t$  is the time in seconds after the start of heating.

Using this model one equation that can be formed is  $20a + b = 25$

- (a) Using the model, write down a second equation in  $a$  and  $b$ . from  $(50, 37)$

$$50a + b = 37$$

- (b) Using your graphic display calculator or otherwise, find the value of  $a$  and of  $b$ .

- (c) Use the model to predict the temperature of the liquid 60 seconds after the start of heating.

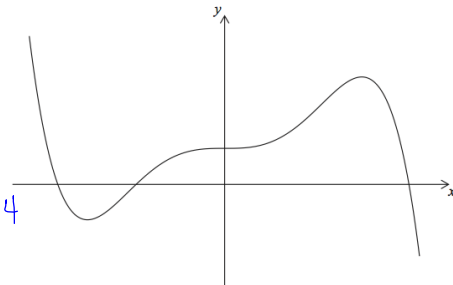
b) Solve System

$$\begin{array}{r} 50a + b = 37 \\ - (20a + b = 25) \\ \hline 30a = 12 \\ a = 0.4 \end{array}$$

$$\begin{array}{r} 20(0.4) + b = 25 \\ - 8 \\ \hline b = 17 \end{array}$$

c) Your model:  $T = 0.4t + 17$   
 use it for  $t = 60 \rightarrow T(60) = 0.4(60) + 17 = 41^\circ\text{C}$

14. A sketch of the function  $f(x) = 5x^3 - 3x^5 + 1$  is shown for  $-1.5 \leq x \leq 1.5$  and  $-6 \leq y \leq 6$ .



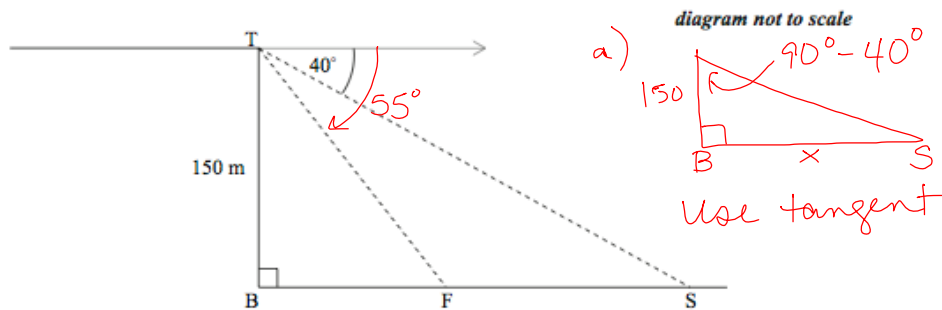
- (a) Write down  $f'(x)$ .  $= 15x^2 - 15x^4$

- (b) Find the equation of the tangent to the graph of  $y = f(x)$  at  $(1, 3)$ .

$f'(1) = 0 \leftarrow$  slope of tangent, so it is a horizontal line:  $y = 3$

- c) Second pt. of intersection:  $3 = 5x^3 - 3x^5 + 1$   
 Enter  $y = 3$  &  $y = f(x)$  into grapher and calculate intersection. Set window  $x: [-2, 2]$   
 $y: [-6, 6]$

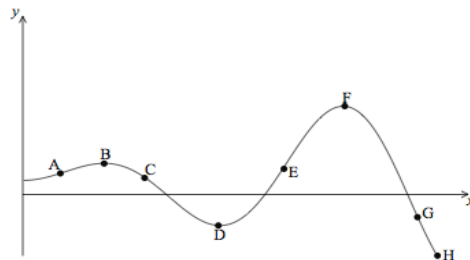
2. Tom stands at the top, T, of a vertical cliff 150 m high and sees a fishing boat, F, and a ship, S. B represents a point at the bottom of the cliff directly below T. The angle of depression of the ship is  $40^\circ$  and the angle of depression of the fishing boat is  $55^\circ$ .



- (a) Calculate, SB, the distance between the ship and the bottom of the cliff. [2 marks]
- (b) Calculate, SF, the distance between the ship and the fishing boat. Give your answer correct to the nearest metre. [4 marks]



5. Consider the graph of the function  $y = f(x)$  defined below.



Write down **all** the labelled points on the curve

- (a) that are local maximum points; compared to points near it highest • B, F [1 mark]
- (b) where the function attains its least value; lowest outcome: H [1 mark]
- (c) where the function attains its greatest value; highest outcome: F [1 mark]
- (d) where the gradient of the tangent to the curve is positive; [1 mark]
- (e) where  $f'(x) > 0$  and  $f''(x) < 0$ ; [2 marks]

which points have positive outcomes?

which points have negative slopes?

the intersection set!

draw tangents at each point and see where they have a positive slope.

8. Members of a certain club are required to register for one of three sports, badminton, volleyball or table tennis. The number of club members of each gender choosing each sport in a particular year is shown in the table below.

A  $\chi^2$  (Chi-squared) test at the 5% significance level is used to determine whether the choice of sport is independent of gender.  $\leftarrow H_0$

	Badminton	Volleyball	Table tennis	Totals
Male	40	20	10	70
Female	20	15	15	50
Totals	60	35	25	120

- (a) Find the expected number of female volleyball players under this hypothesis. [2 marks]
- (b) Write down the  $p$ -value for the test. [2 marks]
- (c) State, with a reason, the conclusion of the test. [2 marks]

a)  $\frac{\# \text{ females}}{\text{total \#}} \cdot \frac{\# \text{ VB players}}{\text{total \#}} \cdot (\text{total \# people})$

$$\frac{50}{120} \cdot \frac{35}{120} \cdot 120 =$$

b)  $\rightarrow$  enter table values in your grapher  
(2 x 3 matrix)

Do  $\chi^2$  test & write down  $p$  value.

c) compare it to 5% significance level.